NOVEMBER, 1973

ESS 497

BIG CHANGES IN E.C. FEED INDUSTRY

by

WALLACE BARR

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

OHIO COOPERATIVE EXTENSION SERVICE

THE OHIO STATE UNIVERSITY

COLUMBUS, OHIO 43210

TABLE OF CONTENTS

BIG CHANGES IN EC FEED INDUSTRY

by

Wallace Barr

The compound feedstuffs industry is one of the most important ancillary industries in the agriculture of highly developed nations. In these nations, rapidly rising incomes have generated a strong demand for high protein foods such as red meat, broilers and eggs. The increasing demand for livestock and poultry products along with technological developments in feed formulation and increasing commercialization of livestock production has meant: 1) rapid growth in the use of cereals in livestock feeding, 2) changes in growth in the compound feed industry, and 3) shifts in the composition of livestock rations. In this article, emphasis will be placed on the latter two in the present European Community (EC) and the new entrants beginning January 1, 1973, of Denmark, Ireland and United Kingdom.

USE OF CEREALS

In the present EC, human consumption of all cereal grains for food and drink has remained near 30 million metric tons for over a decade. The growing demand for more meat and poultry products has meant a large increase in livestock and poultry numbers. Shifts in the kind of livestock, improved feeding practices and increased rate of feeding per animal have contributed to increasing amounts of grain fed. As a result total use of cereals for livestock and poultry feed reached 47 million metric tons--an increase of 14 million metric tons in the 12 years from 1960-71. Out of the available supply of 77 million metric tons of cereal (after balancing for imports and exports) the livestock and poultry industry in the six EC countries today uses about 60 percent of the total available cereal grains. Back in 1960 about half of the 62 million tons of the available cereals were used by livestock in the EC. The use of cereals by livestock and poultry in the United Kingdom in 1969-70 amounted to 60 percent of the total 22 million tons of home-grown and imported cereals.1/

GROWTH IN THE COMPOUND FEED INDUSTRY

The EC compound feed industry produced 31,966,900 metric tons of mixed feeds in 1970--over 2.5 times the 12,463,000 tons produced in 1960. (Table 1) This is a very high annual rate of growth.

The United Kingdom in 1960 produced 8,646,000 short tons of compound feed. By 1970 mixed feed output was 10,750,000 tons or upon conversion to metric tons 61 percent as much as all the EC countries. United Kingdom growth was only 24 percent in the decade. The smaller increase in United Kingdom compound feed output results from having developed at an earlier time a highly sophisticated compound feed industry.

1/ Sturgess, I.M. and Reeves, R., The Potential Market for British Cereals, Home-Grown Cereals Authority, Haymarket House, Oxendon Street, London, SW1Y4EF, p. 1-2.

Table 1. COMPOUND FEED PRODUCTION BY SIX E.E.C. COUNTRIES DENMARK AND UNITED KINGDOM, SELECTED YEARS

(1,000 Tons)[a/]

	1960		1965		1970		Growth %
	Tons	Percent	Tons	Percent	Tons	Percent	1970/1960
			Six E.C. Countries				
Belgium-Lux.	1,553.6	12.5	2,527.0	11.9	4,314.3	13.5	277.7
France	2,217.5	17.8	4,543.5	21.3	6,474.5	20.2	292.0
Italy	800.0	6.4	2,000.0	9.4	3,632.5	11.4	454.1
Netherlands	4,300.0	34.5	5,625.0	26.4	7,850.6	24.5	182.6
West Germany	3,592.5	28.8	6,596.8	31.0	9,727.0	30.4	270.8
Total	12.463.6	100.0	21,292.3	100.0	31,966.9	100.0	256.5
			New Entrants				
U.K.	8,646	XX	9,742	XX	10,750	XX	124.3
Denmark	XX	XX	2,630(1964)	XX	2,575(1967)	XX	XX

a/ Metric tons in all countries except United Kingdom which is short tons.

SOURCE: Ashby, A. W., Livestock Feed Compounding the the 1970's, at ICAM-CAFMNA-SFT Joint Conference, Pillar Hall, Olympia, London, April, 1970.

Esselman, Dr. W., Development of Future Mixed Feed Consumption in the EEC, European Mixed Feed Congress, Rotterdam, May 19, 1972.

The growth rate in feed compounding within the EC varies widely from one country to another. (Table 1) The Netherlands in 1960 produced 4,300,000 metric tons of compound feed or over one-third of the EC total. Today their portion is about one-fourth. The major efforts of the Dutch in the livestock feed industry from 1960 to 1970 were directed toward both quantitative and qualitative improvement in concentrate rations. Their agriculture is based on a highly integrated farm organizational system.

The other five nations of the EC expanded mixed feed output in the decade at very high rates--they were catching up with the Netherlands and United Kingdom. Today each has a bigger share of the total EC mixed feed output than in 1960. There is still some catching up to do but it would appear that the very rapid growth phase in feed compounding in most of the countries will now shift into a more normal and slower rate of expansion.

Factors Influencing Rapid Growth

The growing part played by the compound feed industry was necessary and is justified by a number of factors. One is that no existing single feed has the precise proportion of nutrients required to meet the needs of any species of livestock. Also, farmers have difficulty in mixing feedstuffs on the farm which are properly balanced and the cheapest. In addition, the cheapest feedstuff criteria becomes a very significant factor given the Common Agriculture Policy (CAP) of the EC and differences in transportation costs between regions of the EC.

In the EC increasing livestock and poultry numbers and increasing quantities fed per head of livestock contributed heavily to the demand for compound feed. But this does not explain all the increase in compound feed use. Another factor is the substitution of mixed feeds for farm-grown grains and various fodders--particularly fodder beets and other root crops. Partially offsetting is improved performance of converting feed to meat or livestock and poultry products.

The rapid growth of the EC compound feed industry and changes in the United Kingdom are connected with construction of larger plants than can take advantage of scale economies and the great strides in the use of the computer to attain the best technical results at the least cost. The location of plants varies from port sites or on canals in cereals deficit countries like the Netherlands, Belgium, West Germany and Ireland to interior sites in the grain growing regions of France.

In the United Kingdom 47 percent of the total compound feed output is now produced in interior plant locations compared to one-third just ten years ago.1/ This shift can be attributed to locating plants close to the cereal growing and livestock producing areas as home-grown cereals replaced imported grains.

Where large quantities of cereals are grown the livestock producers tend to buy a larger proportion of high protein concentrates to mix with home-grown cereals rather than a completely mixed feed.

A composite reflection of these and other variables can be seen by examining the production of compound feeds by species (Table 2). In the EC, the swine enterprise has replaced poultry as the major outlet for compound feeds in the 1960-70 period. The two enterprises accounted for 70 percent of total mixed feed output of 31,966,900 metric tons in 1970. The cattle enterprises are taking an increasing proportion of the mixed feeds produced.

In the United Kingdom things are a little different. Their poultry enterprise narrowly retained its lead as the most important outlet for mixed feeds taking 38 percent of the 10,520,000 tons produced in 1970. The cattle industry took 37 percent of the total output in 1970--much higher proportion than in the EC. The United Kingdom swine industry accounted for only 23 percent of the compound feed output in 1970--much lower proportion than the EC.

1/ Sturgess, I. M. and Reeves, R., Ibid, p. 3-15.

Table 2. COMPOUND FEED USE BY SPECIES OF LIVESTOCK IN THE E.E.C. AND UNITED KINGDOM, SELECTED YEARS

	1960	1965	1970
E.C. (Six Countries)			
Total, 1,000 Metric Tons	12,463.6	21,292.3	31,966.9
Cattle, %	24.3	25.9	26.8
Swine, %	33.2	32.5	36.9
Poultry, %	40.1	38.2	33.2
Other, %	2.4	3.4	3.1
Total	100.0	100.0	100.0
United Kingdom			
Total, 1,000 Short Tons	8,646.0	9,742.0	10,520.0
Cattle, %	36.1	34.1	37.1
Swine, %	20.4	22.8	22.8
Poultry, %	41.8	41.4	37.8
Other, %	1.7	1.7	2.3
Total	100.0	100.0	100.0

SOURCE: Ashby, A. W., Livestock Feed Compounding in the 1970's, ICAM-CAFMNA-SFT Joint Conference, Pillar Hall, Olympia, London, April, 1970.

Esselman, Dr. W., Development of Future Mixed Feed Consumption in the EEC, European Mixed Feed Congress, Rotterdam, May 19, 1972.

SHIFTS IN THE COMPOSITION OF RATIONS

In the EC countries there has been a big shift toward the use of proportionately less grain, more protein and more by-product feeds in the concentrate ration of livestock and poultry (Table 3). The biggest shifts

Table 3. APPROXIMATE PERCENTAGES OF CEREALS, PROTEIN & OTHER PRODUCTS IN THE CONCENTRATE RATION IN E.C. 1960-62 AND 1970-71 AND DENMARK, IRELAND & UNITED KINGDOM IN 1970-71

(Percent)

	Grain		Protein		By-Products[a]	
	1960-62	1970-71	1960-62	1970-71	1960-62	1970-71
	E.C. Countries					
Belgium-Lux.	61	42	20	23	19	35
France	54	57[b]	22	25	24	18[b]
Italy	65-70	60-65	20	25	10-15	10-15
Netherlands	65	34	16	21	21	45
West Germany	50[c]	41	28[c]	35	22[c]	24
	New Entrants					
Denmark	XX	79	XX	15	XX	6
Ireland	XX	77[d]	XX	9[d]	XX	14[d]
U.K.	XX	73	XX	10	XX	17

a/ Includes cereal offals, molasses, manioc, fats, dehydrated alfalfa, dried pulps and other processing residues, minerals and vitamins.
b/ Decline in use of by-product (bran) accounts for the shifts.
c/ 1957-61 rather than 1960-62.
d/ Two-year average of 1969-71.
SOURCE: Estimated from country data.

in the composition of a nation's livestock ration from 1960-62 to 1970-71 was in the Netherlands. There the proportion of grain used declined sharply from 65 percent of the total concentrates fed in 1960-62 to 34 percent in 1970-71. At the same time the proportion of protein materials increased nearly one-third and the by-product feeds more than doubled. The absolute quantity of cereals used in compound feeds during the decade has increased in each country, except the Netherlands. Additional discussion of this point will follow.

All other countries, except France, show the same trend but not the magnitude of change as the Netherlands. In France, the decline in the use of bran, a cereal offal, for livestock feed accounts for the reduction in by-product use. It was replaced by grain in the French livestock and poultry rations.

The composition of the livestock and poultry ration in Denmark, Ireland and United Kingdom in 1970-71 is in sharp contrast to that of the EC. The proportion of grain at 73 percent or more in these three countries far exceeds the levels that existed in the EC countries today, or for that matter, prior to the initiation of the common agricultural policy in 1962. With a high proportion of cereals the protein and by-product content of the rations in these three countries must be relatively low.

The cereal proportions in the concentrates fed to livestock may vary considerably from one species of livestock or poultry to another. This is due to biological, nutritional or consumer behavior constraints. The degree of substitution of by-products for cereals may vary the widest for cattle, more narrowly for pigs and still less for poultry. The production of yellow flesh chickens provides the least opportunity to substitute cereal because of the need for yellow corn.

The explanation of shifts in the composition of the concentrate does not lie with the type of livestock. Denmark emphasizes pork production and has a poultry and cattle industry. Ireland emphasizes cattle using their abundant grass, and has a small pork and poultry industry. The United Kingdom emphasizes poultry and cattle while pork production is relatively less important. Some factors other than the composition of the nation's livestock population must be important.

Grain Use Contrasted

The proportion of grain in livestock rations of the Netherlands and United Kingdom each year from 1961 through 1970 follow divergent and contrasting patterns (Table 4). In the United Kingdom not only has the amount of concentrates fed increased from 16,115,000 tons in 1961-72 to 18,293,000 tons in 1969-70 but the proportion of cereals in that ration increased from 66 percent to 73 percent in the same time span.[1/]

1/ Sturgess, I. M. and Reeves, R., Ibid, p. 32.

Table 4. PERCENTAGE OF GRAIN USED IN LIVESTOCK RATIONS, NETHERLANDS AND UNITED KINGDOM, 1961-70

	U.K.[a]	Netherlands[b]
	%	%
1961-62	65.9	66.1
1962-63	69.3	65.3
1963-64	68.8	63.1
1964-65	70.0	61.0
1965-66	69.9	57.2
1966-67	69.6	48.8
1967-68	71.2	48.4
1968-69	71.0	44.5
1969-70	73.1	34.8

a/ Grains, excluding cereal offals, as percent of total feed concentrates used.

b/ Grains, excluding cereals offals, as percent of total compound feeds. However, compound feeds account for 98 percent of all concentrates fed.

SOURCE: Sturgess, I.M. and Reeves, R., Perkins, Louise M., EC Imports of Non-Grain Feedstuffs Almost Equal Feed Grain Imports, Foreign Agricultural Trade of the U.S., E.R.S., U.S.D.A., Washington, D.C., July, 1972.

In the Netherlands, the proportion of grain used in compound feeds (98 percent of all concentrates fed) declined steadily from 66 percent in 1961-62 to 35 percent in 1969-70. This means 2,838,000 metric tons of cereals were used out of 4,300,000 tons of compound feeds in 1961-62. In 1969-70 the cereal use amounted to 2,747,710 metric tons out of 7,850,600 tons of concentrates fed to Dutch livestock and poultry.

Feed Grain Substitution

There are numerous causes for this shift in the composition of the concentrate ration in the Netherlands. Most important are the relatively high EC grain prices (agreed upon in 1962) along with the variable levy that protects the EC cereal products from competition from imported cereals. Also there is either a low levy or no levy on by-product ingredients that compete with grains. Included are the cereal offals like corn gluten feed or bran, dehydrated alfalfa, dried beet pulp, dried citrus pulp, processing by-products, and manioc. No levy exists on soybean or soybean meal.

Also, the Dutch have excellent port facilities and low cost water transportation that reduces distribution costs. The feed industry uses computer capabilities to determine least-cost feed combinations within the constraints of nutritional requirements, biological constraints, and feed values of various ingredients.

Under these conditions the use of the lower energy cost cereal substitutes has been encouraged. For example, there has been a rapid increase in EC imports

of low levy, dried, and pelleted manioc from Thailand and Indonesia. It has been priced near $70 per metric ton at Rotterdam compared to about $95 for barley. This product will be used to illustrate the shift from cereals to cereal substitutes and helps explain some of the differential rate of changes shown in Table 4. The increased use of manioc in West Germany, Netherlands and Belgium is due in part to: 1) its lower price relative to barley, wheat or corn, 2) the cost of transportation, and 3) difference in price support levels among regions of the EC.

France has the lowest support prices for cereals and they must use higher transport cost trucks and trains to move cereals out, or manioc into the grain growing regions. To ship manioc for livestock feed to its interior agricultural region means prices of manioc are above barley prices. Thus, the French feed the lower cost grains to livestock--not the substitutes.

Germany, Netherlands and Belgium have lower cost water transportation and higher cereal support prices. Thus, their farmers sell grains to the price support agency and purchase mixed feeds containing lower priced cereal substitutes.

The Italian livestock industry requires the higher truck and train transportation for feed movement from ports. But more importantly, the variable levy on corn for feed use in Italy is $7.50 per metric ton below that of other EC countries. It is estimated that the Italians use more cereals and less by-products than the other nations.

Potential By-Product Substitution by New Entrants

Denmark, Ireland and United Kingdom will join the EC on January 1, 1973. Negotiations provided that the full variable levy be adopted toward third country imports with internal arrangements for intra-EC trade. Each agreed to adjust their domestic agricultural support prices in six steps to reach the EC level as of January 1, 1978.

The total amount of cereals used in concentrates of all three countries will probably continue to rise, but the relative proportion of cereals in the concentrate ration is expected to trend downward after joining the EC (Table 3). There may be differential rates of change in the three countries.

Let's first examine the prospects for by-products substituting for cereals in the United Kingdom. Little doubt exists that by-products use will increase, and the proportion of cereals in the concentrate ration will decline. There is some question as to how soon, how much and what substitutes.

To discuss substitution for cereals with by-products an understanding of the United Kingdom adjustment from a relative low grain price policy to the EC policy is necessary. The negotiations provided that the price of barley in the United Kingdom would be supported at £27 per ton starting January 1, 1973. Furthermore, the agreement provided six adjustments of £3 per ton in the five years to January 1, 1978. At this time barley prices would be supported at £42 per ton. This would bring the United Kingdom level for barley in line with those of the EC after adjusting for transportation.

Manioc illustrates the potential for substituting by-products for cereals in the concentrate rations in the United Kingdom. The price of manioc in Rotterdam in the summer of 1972 was near £29 per ton. Transportation costs to ports in the United Kingdom at that time amounted to about £3 per ton. In-factory cost may be low to £3 per ton depending upon whether the feed mill is on-dock or located at a non-dock site. Thus, for mills located at the ports manioc costs may range from £32 to 35 per ton. If these relative prices and costs hold barley would remain a lower cost energy feed ingredient than manioc through 1975 and possibly through 1976.

For those feed mills located at interior locations the additional transportation costs are about £2 per ton. At these locations, the total cost of manioc would have been about £37 per ton in 1972. If prices and costs remain near these levels it would be 1977 before manioc might replace barley in livestock rations.

But these calculations ignore the fact that manioc has virtually no protein and fat. Thus, protein meal and fat must be added to concentrate rations to correct these deficiencies. With the additional and higher per ton costs of protein meal the use of manioc by feed compounding mills will be further delayed.

The trend toward location of feed compounding plants and capacity in the grain and livestock producing locations may or may not continue. If it does the use of imported manioc likely will be low; even after complete adjustment to EC prices. The tendency of feed compounders and livestock producers in grain producing regions is to emphasize the use of high protein feeds to supplement the locally grown grain. This reduces total transportation costs compared to a complete compounded feed manufactured at port sites.

It must be remembered, the amount of manioc that can replace cereals varies by species of livestock. For poultry its use is very limited, and poultry takes 38 percent of the total concentrates fed. For hogs, manioc can replace only 15 to 20 percent of the cereal component because of its tendency to cause diarrhea. The United Kingdom hog industry uses less than 25 percent of the total concentrates fed. The cattle enterprise can use large quantities of by-products but the cereal offals and dried pulps are preferred.

The feed compounders and the livestock industry in the United Kingdom have the capability to readily use cereal substitutes and will do so under favorable conditions. Conditions are not, however, so favorable for the use of cereal substitutes as in the Netherlands, Belgium or West Germany.

In Ireland, cost conditions, price support levels, and transportation charges are quite similar to the United Kingdom. They differ in that they produce little grain and they emphasize cattle. It would appear the use of cereal substitutes will grow, but at a rate similar to the United Kingdom.

In Denmark, things are somewhat different. They adjusted price supports for barley upward upon expectation of EC entry. So their five-year adjustment is much less than in Ireland or United Kingdom. With a much higher cereal price they have the opportunity to substitute by-products almost immediately.

In Denmark the relationship between the by-product costs, including additional transportation to Denmark, and the price support level for barley will be the determinants of by-product use. If by-product substitutes lower feed costs, then Danish producers will use the substitutes for livestock feed and deliver higher priced barley to the price support agency.